Nonlinear Analysis

Theory, Methods & Applications

OL.
7
983

Index to Volume 7, 1983

Pergamon Press Oxford · New York · Frankfurt

NONLINEAR ANALYSIS
THEORY, METHODS & APPLICATIONS

Editor: Prof. V. Lakshmikantham, Department of Mathematics, University of Texas at Arlington, Arlington, Texas 76019, USA

Editorial Secretary: Ms. M. Pruiett

Honorary Editorial Board

R. Bellman, *University of Southern California, Los Angeles, CA, USA*
L. Cesari, *University of Michigan, Ann Arbor, MI, USA*
E. A. Coddington, *University of California, Los Angeles, CA, USA*
P. Hartman, *Johns Hopkins University, Baltimore, MD, USA*
D. A. Kendall, *Cambridge University, Cambridge, England*
J. P. LaSalle, *Brown University, Providence, RI, USA*
J. L. Lions, *College de France, Paris 1e, France*
P. A. Samuelson, *Massachusetts Institute of Technology, Cambridge, MA, USA*

Associate Editorial Board

H. A. Antosiewicz, *University of Southern California, Los Angeles, CA, USA*
R. Aris, *University of Minnesota, Minneapolis, MN, USA*
T. B. Benjamin, *Mathematical Institute, 24–29 St. Giles, Oxford, England*
A. Bensoussan, *IRIA, Le Chesney, France*
A. T. Bharucha-Reid, *Wayne State University, Detroit, MI, USA*
H. Brezis, *4 Place Jussieu, Paris, France*
R. Brockett, *Harvard University, Cambridge, MA, USA*
F. Browder, *University of Chicago, Chicago, IL, USA*
J. Chandra, *Army Research Office, Durham, NC, USA*
R. Conti, *Via G. B. Amici 14/A 50134, Firenze, Italy*
C. Corduneanu, *Department of Mathematics, University of Texas at Arlington, TX 76019, USA*
M. G. Crandall, *University of Wisconsin, Madison, WI, USA*
Jane Cronin, *Rutgers University, New Brunswick, NJ, USA*
A. Friedman, *Northwestern University, Evanston, IL, USA*
R. P. Gilbert, *University of Delaware, Newark, DE, USA*
A. Halanay, *Bucharest University, R-70109 Bucuresti, Rumania*
J. K. Hale, *Brown University, Providence, RI, USA*
T. G. Hallam, *University of Tennessee, Knoxville, TN 37916, USA*
W. A. Harris, Jr., *University of Southern California, Los Angeles, CA, USA*
L. K. Jackson, *University of Nebraska, Lincoln, NB, USA*
R. Kalaba, *University of Southern California, Los Angeles, CA, USA*
R. E. Kalman, *University of Florida, Gainesville, FL, USA, and ETH, Zurich, Switzerland*
F. Kappel, *Universität Graz, Graz, Austria*
M. A. Krasnoselskii, *Institute of Control Sciences, Moscow, USSR*
S. Leela, *State University of New York at Geneseo, NY, USA*
R. H. Martin, Jr., *North Carolina State University, Raleigh, NC 27607, USA*
J. Mawhin, *Université Catholique de Louvain, Belgium*
R. May, *Princeton University, Princeton, NJ, USA*
J. B. McLeod, *Wadham College, Oxford, England*
E. Montroll, *University of Rochester, Rochester, NY 10021, USA*
A. Myshkis, *Altufevscoy Shosse, Moscow, USSR*
Z. Nashed, *University of Delaware, Newark, DE, USA*
L. Nirenberg, *New York University-Courant, New York, NY, USA*
J. A. Nohel, *University of Wisconsin, Madison, WI 53706, USA*
T. Oden, *University of Texas at Austin, Austin, TX 78712, USA*
M. N. Oğuztöreli, *University of Alberta, Edmonton, Alberta, Canada*
C. Olech, *Instytut Matematyczny PAN, Warszawa, Poland*
L. Salvadori, *Dipertimento di Matematica, Universitate di Trento, 38050-Trento, Italy*
M. Scott, *Sandia Corporation, Albuquerque, NM, USA*
C. P. Tsokos, *University of Southern Florida, Tampa, FL, USA*
W. Walter, *Universität Karlsruhe, 75 Karlsruhe, West Germany*

VOL. 7 1983

Publishing and Advertising Offices

Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW (Oxford 64881; Telex 83177).

Subscription Rates (1984)

For libraries, university departments, government laboratories, industrial and other multiple-reader institutions: US $225.00 per annum. Two-year rate (1984–85): $427.50 (including postage and insurance). Subscription enquiries from customers in North America should be sent to: Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, USA, and for the remainder of the world to: Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW, UK.

Specially Reduced Rates for Individuals. In the interests of maximizing the dissemination of the research results published in this important international journal, we have established a two-tier price structure. Any individual, whose institution takes out a library subscription, may purchase a second or additional subscriptions for *personal* use at the much reduced rate of US $55.00 per annum.

Microform Subscriptions and Back Issues: Back issues of all previously published volumes are available in the regular editions and on microfilm and microfiche. Current subscriptions are available on microfiche simultaneously with the paper edition and on microfilm on completion of the annual index at the end of the subscription year.

Published Monthly

Copyright © 1983 Pergamon Press Ltd.

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publishers if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organisations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical photocopying, recording or otherwise, without permission in writing from the copyright holder.

U.S. Copyright Law Applicable to Users in the U.S.A.

Photocopying information for users in the U.S.A.: The Item-Fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law is paid. The appropriate remittance of $3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 21 Congress Street, Salem, MA 01970. The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying. In case of doubt please contact your nearest Pergamon office.

The Item-Fee Code for this publication is: 0362-546X/83 $3.00 + .00

Volume Contents

Volume 7 Number 1

W. V. Petryshyn and Z. S. Yu	1	Periodic solutions of certain higher order nonlinear differential equations
P. J. McKenna	15	On nonlinear perturbations which cross the eigenvalues
R. E. Moore and S. Zuhe	21	An interval version of Chebyshev's method for nonlinear operator equations
L. Turyn	35	Perturbation of linked eigenvalue problems
M. Biroli and U. Mosco	41	Stability and homogenization for nonlinear variational inequalities with irregular obstacles and quadratic growth
J. J. Nieto	61	Problems at resonance for first and second order differential equations via Lyapunov-like functions
G. Villari	71	On the existence of periodic solutions for Liénard's equation
P. Nistri	79	Periodic control problems for a class of nonlinear periodic differential systems
S. Heikkilä	91	On the quasimonotonicity of differential systems
T. D. Rogers and F. R. Marotto	97	Perturbations of mappings with periodic repellers
E. H. Anderson and M. J. Anderson	101	Dependence of the solutions of quasi-linear evolution equations on initial conditions
J. Rodriguez	107	Nonlinear differential equations under Stieltjes boundary conditions
M. Bertsch	117	A class of degenerate diffusion equations with a singular nonlinear term

Volume 7 Number 2

A. Haraux and H. Cabannes	129	Almost periodic motion of a string vibrating against a straight fixed obstacle
Cheng Shaozhong and Liu Dsosu	143	An example which has no fixed point
J. C. Cathala	147	Absorptive area and chaotic area in two-dimensional endomorphisms
G. Gripenberg	161	An estimate for the solution of a Volterra equation describing an epidemic
P. Brunovský	167	Notes on chaos in the cell population partial differential equation
P. L. Lions	177	Bifurcation and optimal stochastic control

S. KESAVAN and P. N. SRIKANTH — 209 — On the Dirichlet problem for the Marguerre equations

P. VOLKMANN — 217 — On the convergence of approximate solutions for an initial value problem in Banach spaces

R. SHIVAJI — 223 — Uniqueness results for a class of positone problems

A. MORRO and B. STRAUGHAN — 231 — Highly unstable solutions to completely nonlinear diffusion problems

Volume 7 Number 3

HOU, SHUI-HUNG — 239 — Existence theorems of optimal control problems in Banach spaces

R. P. AGARWAL — 259 — Boundary value problems for higher order integro-differential equations

S. AIZICOVICI — 271 — On the asymptotic behaviour of solutions of Volterra equations in Hilbert space

I. A. RUS — 279 — On a theorem of Eisenfeld-Lakshmikantham

V. BARBU, G. DA PRATO and C. POPA — 283 — Existence and uniqueness of the dynamic programming equation in Hilbert space

B. ZWAHLEN — 301 — The behaviour of the critical value of an equation under small perturbations

LIU DSOSU and CHENG SHAOZHONG — 309 — On fixed point theorems for random set-valued maps

Volume 7 Number 4

L. QI — 325 — Uniqueness of the maximal extension of a monotone operator

R. REDHEFFER and W. WALTER — 333 — On parabolic systems of the Volterra predator–prey type

S. LEELA — 349 — Monotone method for second order periodic boundary value problems

C. CORDUNEANU — 357 — Almost periodic solutions to nonlinear elliptic and parabolic equations

M. J. ESTEBAN — 365 — Nonlinear elliptic problems in strip-like domains: symmetry of positive vortex rings

M. J. ESTEBAN and P. L. LIONS — 381 — A compactness lemma

P. E. SACKS — 387 — Continuity of solutions of a singular parabolic equation

VOL. 7 1983

J. HENDERSON 411 Three-point boundary value problems for ordinary differential equations by matching solutions

E. SACHS 419 Characterization of bang-bang principles

J. C. KURTZ 431 Nonlinear boundary value problems for elliptic differential operators singular on a hyperplane

C. BANDLE and M. MARCUS 439 *A priori* estimates and the boundary values of solutions for a problem arising in plasma physics

Volume 7 Number 5

I. MASSABO and A. VIGNOLI 453 Irreducible continua of solutions for Birkhoff–Kellogg type equations

T. JONSSON 463 Some nonlinear differential equations in the hyperbolic plane

G. EMMANUELE 473 A remark on my paper "convergence of the Mann–Ishikawa iterative process for nonexpansive mappings"

M. GIRARDI and M. MATZEU 475 Some results on solutions of minimal period to superquadratic Hamiltonian systems

R. J. P. DE FIGUEIREDO 483 On the existence of N periodic solutions of Liénard's equation

S. BUSENBERG and M. IANNELLI 501 A class of nonlinear diffusion problems in age-dependent population dynamics

S. UMAMAHESWARAM 531 An intermediate value property: Some comparison and convergence theorems in $\lambda(n, K)$-parameter families

E. N. DANCER, R. D. NUSSBAUM and C. STUART 539 Quasinormal cones in Banach spaces

T.-C. LIM 555 Fixed point theorems for uniformly Lipschitzian mappings in L^p spaces

Volume 7 Number 6

R. F. MANASEVICH 565 A non variational version of max–min principle

H. C. MORRIS, E. E. RYAN and R. K. DODD 571 Snap-back repellers and chaos in a discrete population model with delayed recruitment

H. C. MORRIS, E. E. RYAN and R. K. DODD 623 Periodic solutions and chaos in a delay-differential equation modelling haematopoesis

V. COMINCIOLI and A. TORELLI 661 Mathematical aspects of the cross-bridge mechanism in muscle contraction

Volume 7 Number 7

M. MARTELLI and A. VIGNOLI	685	On the structure of the solution set of nonlinear equations
J. APPELL and P. P. ZABREJKO	695	On a theorem of M. A. Krasnosel'skij
S. GUTMAN	707	Evolutions governed by m-accretive plus compact operators
E. N. DANCER	717	On the existence of zeros of perturbed operators
C. P. GUPTA	729	Leray–Schauder type continuation theorems for some nonlinear equations in Banach spaces
W. STORK	739	Perturbation by vanishing nonlinearities
A. CAÑADA and P. MARTINEZ-AMORES	747	Periodic solutions of nonlinear vector ordinary differential equations of higher order at resonance
N. S. PAPAGEORGIOU	763	Fixed point theorems for multifunctions in metric and vector spaces
J. S. TREIMAN	771	Characterization of Clarke's tangent and normal cones in finite and infinite dimensions
C. ROGERS, M. P. STALLYBRASS and D. L. CLEMENTS	785	On two phase filtration under gravity and with boundary infiltration: application of a Bäcklund transformation
R. B. POTTS	801	Van der Pol difference equation

VOL. 7 1983

Volume 7 Number 8

P. W. ELOE	813	A boundary value problem for a system of difference equations
Y. EBIHARA	821	Modified variational inequalities to semilinear wave equations
E. DIBENEDETTO	827	$C^{1+\alpha}$ local regularity of weak solutions of degenerate elliptic equations
J. R. GRAEF and P. W. SPIKES	851	On the nonlinear limit-point/limit-circle problem
P. KORMAN	873	Existence of periodic solutions for a class of nonlinear problems
C. A. STUART	881	Convergence of algorithms for problems of Landesman–Lazer type
A. MUKHERJEA and J. S. RATTI	899	On a functional equation involving iterates of a bijection on the unit interval
M. L. SLATER and A. H. WANG	909	On the equation $\phi(x) = \int_{I_x} f[\phi(\xi)]\, d\mu(\xi)$

S. SOLIMINI 917 Existence of a third solution for a class of b.v.p. with jumping nonlinearities

V. BENCI, A. CAPOZZI and D. FORTUNATO 929 On asymptotically quadratic Hamiltonian systems

Volume 7 Number 9

HU SHOU-CHUAN 933 Ordinary differential equations involving perturbations in Banach spaces

V. M. SOUNDALGEKAR, M. SINGH and H. S. TAKHAR 941 MHD free convection past a semi-infinite vertical plate with suction and injection

W. ZULEHNER and W. F. AMES 945 Group analysis of a semilinear vector diffusion equation

T. GALLOUET and J. M. MOREL 971 On some properties of the solution of the Thomas–Fermi problem

P. BARTOLO, V. BENCI and D. FORTUNATO 981 Abstract critical point theorems and applications to some nonlinear problems with "strong" resonance at infinity

R. KANNAN, V. LAKSHMIKANTHAM and J. J. NIETO 1013 Sufficient conditions for existence of solutions of nonlinear boundary value problems at resonance

K. BALAKRISHNA REDDY and P. V. SUBRAHMANYAM 1021 Directional contractors and fixed points of multivalued mappings

SHEN ZUHE 1029 On some classical existence theorems

F. A. HOWES 1035 Nearly discontinuous solutions of a class of nonlinear boundary value problems

M. ALTMAN 1043 Weak contractor directions and weak directional contractions

Volume 7 Number 10

K. M. DAS and M. P. DEVASAHAYAM 1051 Quasi-solutions and monotone method for infinite systems of nonlinear boundary value problems

A. S. DO NASCIMENTO 1061 Bifurcation of radially symmetric equilibria of a parabolic equation

CH. G. PHILOS 1071 Oscillation of sublinear differential equations of second order

M. ALTMAN 1081 A new approach to quasi-linear evolution equations in non-reflexive Banach spaces

W. A. ROSENKRANTZ and LI ZHAN BING	1089	Diffusion approximation for a class of Markov processes satisfying a nonlinear Fokker–Planck equation
P. K. PALAMIDES	1101	A topological method and its application on a general boundary value problem
I. SINGER	1115	The lower semi-continuous quasi-convex hull as a normalized second conjugate
J. F. SELGRADE	1123	On the existence and uniqueness of connecting orbits
T. CAZENAVE	1127	Stable solutions of the logarithmic Schrödinger equation
DING WEIYUE and HONG CHONGWEI	1141	Periodic solutions of a nonlinear beam equation
R. KALABA and A. TISHLER	1149	On the use of higher order derivatives in optimization using Lagrange's expansion

VOL.
7
198

Volume 7 Number 11

Z. ARTSTEIN	1163	Stabilization with relaxed controls
A. FRIEDMAN and T. I. VOGEL	1175	Cavitational flow in a channel with oscillatory wall
L. BRÜLL	1193	On the existence theory for nonlinear Schrödinger and wave equations without Lipschitz-estimates
S. AHMAD and F. MONTES DE OCA	1209	On the existence of nonconstant periodic solutions I
S. AHMAD	1219	On the existence of nonconstant periodic solutions II
J. BEBERNES and R. ELY	1225	Existence and invariance for parabolic functional equations
EN HAO YANG	1237	On some new discrete inequalities of the Bellman–Bihari type
G. CORLISS	1247	On computing Darboux type series analyses
S. D. MILUSHEVA and D. D. BAINOV	1255	Justification of partially-multiplicative averaging for a class of functional–differential equations with impulses
L. T. WATSON, S. M. HOLZER and M. C. HANSEN	1271	Tracking nonlinear equilibrium paths by a homotopy method

Volume 7 Number 12

A. S. VATSALA	1283	On the existence of periodic quasi-solutions for first order systems
J. PRÜß	1291	Stability analysis for equilibria in age-specific population dynamics

H. PETERS	1315	Chaotic behaviour of nonlinear differential–delay equations
N. PARHI	1335	On the existence and continuous dependence of solutions of a class of neutral functional–differential equations
R. LEMMERT and P. VOLKMANN	1347	Differential inequalities for terminal value problems
H.-P. HEINZ	1351	On the behaviour of measures of noncompactness with respect to differentiation and integration of vector-valued functions
J. V. HEROD	1373	Series solutions for nonlinear Boltzmann equations
K. SCHUMACHER	1389	Hopf bifurcation with constraints
S. BUSENBERG and M. IANNELLI	1411	A degenerate nonlinear diffusion problem in age-structured population dynamics
B. AULBACH	1431	Asymptotic stability regions via extensions of Zubov's method—I
B. AULBACH	1441	Asymptotic stability regions via extensions of Zubov's method—II
M. NAKAO	1455	On some regularizing and decay estimates for nonlinear diffusion equations
M. ALTMAN	1463	A general local existence theorem for quasi-linear evolution equations in nonreflexive Banach spaces

OL.
7
983

VOL.
7
198

Author Index

Agarwal, R.P. 259
Ahmad, S. 1209,1219
Aizicovici, S. 271
Altman, M. 1043,1081,1463
Ames, W.F. 945
Anderson, E.H. 101
Anderson, M.J. 101
Appell, J. 695
Artstein, Z. 1163
Aulbach, B. 1431,1441

Bainov, D.D. 1255
Balakrishna Reddy, K. 1021
Bandle, C. 439
Barbu, V. 283
Bartolo, P. 981
Bebernes, J. 1225
Benci, V. 929,981
Bertsch, M. 117
Biroli, M. 41
Brunovský, P. 167
Brull, L. 1193
Busenberg, S. 501,1411

Cabannes, H. 129
Cañada, A. 747
Capozzi, A. 929
Cathala, J.C. 147
Cazenave, T. 1127
Chongwei, H. 1141
Clements, D.L. 785
Comincioli, V. 661
Corduneanu, C. 357
Corliss, G. 1247

Dancer, E.N. 539,717
Da Prato, G. 283
Das, K.M. 1051
De Figueiredo, R.J.P. 483
Devasahayam, M.P. 1051
DiBenedetto, E. 827
Dodd, R.K. 571,623
Do Nascimento, A.S. 1061
Dsosu, L. 143,309

Ebihara, Y. 821
Eloe, P.W. 813
Ely, R. 1225
Emmanuele, G. 473
Esteban, M.J. 365,381

Fortunato, D. 929,981
Friedman, A. 1175

Gallouet, T. 971
Girardi, M. 475
Graef, J.R. 851
Gripenberg, G. 161
Gupta, C.P. 729
Gutman, S. 707

Hansen, M.C. 1271
Haraux, A. 129
Hao Yang, E. 1237
Heikkilä, S. 91
Heinz, H.P. 1351
Henderson, J. 411
Herod, J.V. 1373
Holzer, S.M. 1271
Hou, S.-H. 239
Howes, F.A. 1035

Iannelli, M. 501,1411

Jonsson, T. 463

Kalaba, R. 1149
Kannan, R. 1013
Kesavan, S. 209
Korman, P. 873
Kurtz, J.C. 431

Lakshmikantham, V. 1013
Leela, S. 349
Lemmert, R. 1347
Lim, T.-C. 555
Lions, P.L. 177,381

Manasevich, R.F. 565
Marcus, M. 439
Marotto, F.R. 97
Martelli, M. 685
Martinez-Amores, P. 747
Massabo, I. 453
Matzeu, M. 475
McKenna, P.J. 15
Milusheva, S.D. 1255
Mosco, U. 41
Montes de Oca, F. 1209
Moore, R.E. 21
Morel, J.M. 971
Morris, H.C. 571,623
Morro, A. 231
Mukherjea, A. 899

Nakao, M. 1455
Nieto, J.J. 61,1013
Nistri, P. 79
Nussbaum, R.D. 539

Palamides, P.K. 1101
Papageorgiou, N.S. 763
Parhi, N. 1335
Peters, H. 1315
Petryshyn, W.V. 1
Philos, C.H.G. 1071
Popa, C. 283
Potts, R.B. 801
Prüß, J. 1291

Qi, L. 325

Ratti, J.S. 899
Redheffer, R. 333
Rodriguez, J. 107
Rogers, C. 785
Rogers, T.D. 97
Rosenkrantz, W.A. 1089
Rus, I.A. 279
Ryan, E.E. 571,623

Sachs, E. 419
Sacks, P.E. 387
Schumacher, K. 1389
Selgrade, J.F. 1123
Shaozhong, C. 143,309
Shivaji, R. 223
Shou-Chuan, H. 933
Singer, I. 1115
Singh, M. 941
Slater, M.L. 909
Solimini, S. 917
Soundalgekar, V.M. 941
Spikes, P.W. 851
Srikanth, P.N. 209
Stallybrass, M.P. 785
Stork, W. 739
Straughan, B. 231
Stuart, C.A. 539, 881
Subrahmanyam, P.V. 1021

Takhar, H.S. 941
Tishler, A. 1149
Torelli, A. 661
Treiman, J.S. 771
Turyn, L. 35

Umamaheswaram, S. 531

Vatsala, A.S. 1283
Vignoli, A. 453,685
Villari, G. 71
Vogel, T.I. 1175
Volkmann, P. 217,1347

Walter, W. 333
Wang, A.H. 909
Watson, L.T. 1271
Weiyue, D. 1141

Yu, Z.S. 1

Zabrejko, P.P. 695
Zhan Bing, L. 1089
Zuhe, S. 21,1029
Zulehner, W. 945
Zwahlen, B. 301

OL.
7
983